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By Frank Woodbury, A.M., M.D.

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ON

DISORDERED DIGESTION

— AND —

DYSPEPSIA.

BY

FRANK WOODBURY, A. M., M. D.,

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GEORGE S. DAVIS,
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PREFACE.

The past few years have witnessed a marked advance in our knowledge of the chemistry of the digestive process, and of the rôle of micro-organisms in the alimentary canal under different conditions. There are indications that disorders of digestion which, in token of ignorance, were classed as functional a short time ago, are now in a fair way of being better understood, and better treated, in the light afforded of the conditions which produce them. Fermentation of food in the stomach has long been a well-known characteristic of certain forms of dyspepsia, but it was left for Milne Edwards (1862), fresh from the study of Pasteur's work on lactic and butyric acid fermentation, to apply his results to the explanation of cases of acid dyspepsia, and to declare, that "we are led to the conclusion that the phenomena of lactic and butyric fermentation which is manifested in the digestive tube, may well depend upon the action of infusoria (or microbes ?) which live and multiply in the interior of this canal ; a hypothesis which explains the production of two gases found here : viz., hydrogen and carbonic acid." Leared had also shown (1860) in "Experiments as to the Cause of Heartburn," that this symptom is due to the presence in the stomach of butyric acid, a product of lactic fermentation. Among papers that have recently appeared, may be noticed, prominently, Vaughan's valuable contributions on Tyrotoxicon as a cause of digestive disturbance in young children, T. Lauder Brunton on "Poisons formed from Food and their Relation to Biliousness and Diarrhœa," and Sir Andrew Clarke's "Chlorosis, or Fæcal Intoxication as a Cause of Anæmia." Frequent communications of this character in current medical literature, show the interest which has been excited in disorders of digestion by the work of

Pasteur, Koch, Duclaux, Vignal, Abelous and many other indefatigable investigators in the field of bacteriology and biology, and indicate the direction of further progress in the study of disorders of the stomach. The possession of more light than ever before may even enable us to approach the subject "so vast and so obscure," as Trousseau styled it, of dyspepsia, with the hope that the days of empirical treatment of the disorders of such an important function as digestion, are almost if not quite at an end, and that we may now consider them intelligently and treat them rationally in accordance with the old dictum of the schools, *obsta principiis*.

FRANK WOODBURY.

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DISORDERED DIGESTION

—AND—

DYSPEPSIA.

INTRODUCTION.

Comparative anatomy shows that man's digestive apparatus in its type repeats characters found both among the carnivora and the ruminants. His simple stomach with lengthy digestive tract, his cutting and grinding teeth, confirm what long experience has conclusively and abundantly shown, that for him a mixed diet is most suitable. While man is, therefore, properly styled an omnivorous eater—and, indeed, while observation of all sorts and conditions of men, under different circumstances and in all parts of the world, goes far towards proving this to be correct in fact—yet it is observed that in civilized communities he is inclined to become rather fastidious, limiting his food to a comparatively few articles, and almost invariably requiring these to be prepared by cooking

and associated with condiments so as to make them palatable, appetizing and more readily digestible.

The need for constantly renewing the supply of nourishment, arises from certain well established physiological principles, which may well be borne in mind in the treatment of every case of dyspepsia.

The exercise of any function of the body is made possible only through the principle of the transformation of energy. The normal expenditure by the human organism of force, in the form of heat, electricity, cell-activity and mechanical motion, amounts each day to many thousand units of work. For example, the absolute amount of heat-units daily produced by an adult of average weight, has been variously estimated from 2200 to 2700, which, if converted into mechanical force, amount to more than would be required to raise his body to a vertical height of over eight miles. In addition to this the work of circulation and respiration, and the expenditure of muscular power in locomotion or other body labor, requires the production of over five hundred foot-tons more.

Of this large amount of force daily produced by the body, therefore, about nine-tenths or five-sixths, according to circumstances, are required simply to maintain the bodily temperature at the normal standard, the remainder being utilized in internal and external dynamical work. It is an axiom that the source of all this energy is the food, and chiefly through the

oxidation of its chemical elements. This process may be roughly compared with the combustion of fuel in the fire-box of an engine, whereby chemical action is transformed into other forms of force and thus made applicable to the performance of various kinds of mechanical work. A certain proportion of the food is also required to furnish new elements to the tissues, to make up for wear and tear; as well in early life to supply material for growth, as in adult life for reproduction and for mental operations. To rebuild the tissues, aliment containing nitrogen is absolutely necessary, but the force which these tissues exert proceeds from the disintegration of materials containing nitrogen (*i. e.*, albuminoids, or proteids), as well as from substances which are destitute of nitrogen, such as the starches and sugars (carbo-hydrates), and fats (hydro-carbons).

The amount and due proportion of these classes of nutritious substances, required to keep the body in a state of health, have now been pretty definitely determined; but, as might be inferred from what has just been said of their relation to nerve- and muscle-force, the figures are subject to some variation in accordance with the nature of the work which the organism is called upon to perform. Thus, if the quantity each day required to maintain the body in health, in a person with moderate exercise, were represented by compounds containing about five thousand grains of carbon, and about two hundred grains of nitrogen;

for others engaged in active, hard-labor, this must be increased from twenty-five to forty per cent., the greater increase being required in the non-nitrogenous elements which are more largely consumed directly in force-production. While food-elements are, therefore, utilized both in building up the tissues and in furnishing heat, the distinction between the classes of histogenetic and thermogenetic alimentary substances is not so sharply drawn at present as it was some years ago, following the teachings of Liebig.

When the food-supplies fall short of the requirements of the body, and the tissue-elements are insufficiently nourished, the easily recognized and well known effects of inanition are observed. First, in addition to feelings of *malaise*, there is dynamic failure: the ill-fed organism is unable to do as much work as before; secondly, there is heat reduction (death by starvation is death by cold); thirdly, there is diminution in the volume of the soft structures, earliest and most extreme in adipose tissue, then in the muscles, and finally, though to a less degree, in the great nerve centers. The animal body, when in good condition, contains a reserve store of food which enables it, for a while, to survive attacks of illness or prolonged fasting when for the time no food can be eaten. Hybernating animals, after sleeping through the winter months, emerge from their hiding places in the spring of the year, lean and hungry. Experiments upon man show, if allowed water to drink, that he can

survive a fast of from thirty to forty days, but if deprived of water he perishes in less than a week. Impaired digestive power is a constant result of the insufficient nourishment so often seen in sewing women. M. Peter considers this form of indigestion a frequent precursor of pulmonary consumption.

When an excess of food over the quantity required by the system is habitually consumed, it to some extent admits of storage in the body as reserve food, especially in the form of fat or adipose tissue. But there is a limit to this. When the diet is habitually in excess, and especially when it contains too great a proportion of nitrogen,, there is developed a diathesis or tendency to disease, in the form particularly of gout, rheumatism, scurvy, and various disorders of the skin; even cancer has been attributed to excessive meat-eating. As the rule, disorders of digestion and dyspepsia appear early and are more or less constant. The term excess, of course, is a relative one, and has to do with the kind as well as the quantity of food, and also depends very much upon what may be termed the individual digestive capacity. Thus, some men are large eaters, others small eaters; some eat everything with impunity; others find that they cannot digest certain articles of food at all, or if they do, it is only after slow and perhaps painful efforts of the stomach to dispose of them. A few articles of food are particularly liable to disagree—thus veal, lobster, shell-fish, or pastry—but in some persons,

digestive disorder follows indulgence in articles of food ordinarily regarded as wholesome. This, which has been attributed to idiosyncrasy (a convenient cloak for ignorance of the real cause), will be considered more fully under the heading of symptomatology.

DIGESTION AND ITS DISORDERS.

It is not at all surprising, when we consider the purely æsthetic and economical principles which have hitherto governed the choice of food, that disordered digestion and what is popularly styled dyspepsia are the most common of human ailments. In diseased conditions of the body, the digestive function is either weakened or entirely suspended for the time, so that a sick person is, in this sense, always more or less a dyspeptic. But many who consider themselves otherwise healthy people, and who are actively engaged in business, find in some form of digestive trouble the bane of their existence. They may even live to old age, though tormented half their days with dyspepsia. Others have learned by experience that attacks of indigestion can only be avoided by exercising great care in the choice of food, and by observing rigid rules as to quantity and regularity, the slightest transgression being followed by punishment.

Digestive disorders, therefore, result naturally both from eating food unsuitable in quality or quantity, and gastric impairment or incapacity; or, to summarize, to a want of relation between the food to be digested and the organism, owing to which the latter finds itself unduly embarrassed in its duties, or entirely incompetent to perform them. But, we may ask, are there no special causes contributing to this result? What agents may disturb this relation?

Experiment outside the body has demonstrated that, in the normal condition, the digestive secretions, —whether from the salivary glands, from the stomach, or from the liver,—show a remarkable power of resistance to putrefaction. For the details of the digestive process, our limits at present are too restricted, and we must refer our readers to the text-books of physiology, but in a general way it may be stated that the food from the time it is taken into the mouth, is constantly under the influence of certain fluids, aided by muscular action which keeps the mass in constant motion until it reaches the sigmoid flexure of the large bowel, where it temporarily accumulates. Although the total quantity of the digestive fluids seems large, it must be remembered that they are absorbed almost as soon as they are poured out, so that there is no excess of fluid in the tract during digestion. The entire quantity thrown out during the day is affected by the nature and quantity of the food, and many other conditions, but it may be stated that the food is subjected in twenty-four hours to the action of about twenty pounds of digestive fluids (saliva, 1 to 3 pounds; gastric juice, 14; pancreatic secretion, ½; bile, 3 to 4; intestinal juice, ½*). Digestion has been, therefore, considered as a rinsing process in which the proximate elements of food are first made soluble

* These figures are quoted by Leared, and conform closely to the results obtained by Bidder and Schmidt.

and dissolved, and then absorbed through the epithelium of the stomach and intestinal tract. The fact that these fluids prevent fermentation and putrefaction, so that, though the food is in a condition and at a temperature favorable for such changes, they do not ordinarily occur in health, while they are common in various conditions of ill-health, leads to the investigation of this peculiar property, which is so marked in the saliva, gastric juice, and the bile. In what does this antiseptic quality consist, and what is its influence upon digestion? As Pasteur and Tyndall have shown that without microbes fermentation and putrefaction do not occur, it may be stated at once that these fluids and substances mixed with them do not afford a proper culture soil for the ordinary zymogenic bacteria. In the gastric secretion, the hydrochloric acid is held to be the main cause of this antiseptic action, although it is probable that when the pepsin is secreted in proper quantity and of normal activity, it also contributes to this effect by the promptness of its action; and, moreover, the quantity of the gastric juice and the rapidity of its reabsorption, under normal circumstances, would be highly unfavorable to the occurrence of septic changes. Another fact may be assumed to have some weight in this matter. These fluids that are separated from the blood in such quantity are returned to it so rapidly that for practical purposes they may be considered as still constituting a part of the circulating fluid. In other words, living fluids have a

certain power of resistance to septic change, when in a normal condition; the blood has this quality, and the digestive fluids are really a part of the blood, only temporarily separated from it.

Because the zymogenic bacteria do not develop in the healthy stomach, it is not proper to infer that the growth of other forms of micro-organisms is affected in the same way. Abelous* discovered that in the normal condition certain microbes are always to be found in the stomach, which almost all resist the action of the gastric juice, and many of which are able to live and develop in a medium containing very little oxygen. He was able to isolate and distinguish sixteen species, which he found existing normally in his own stomach, of which two were micrococci, thirteen bacilli, and one vibrio.† Without adopting the extreme hypothesis of Pasteur, that normal digestion is due to the presence of microbes and impossible without them, Abelous claims, first, that it must not

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* Recherches sur les Microbes de l'Estomac a l'État Normal, et leur Action sur les Substances Alimentaires. Paris, 1889.

† Of these, seven were already known: *Sarcina ventriculi*, *Bacillus pyocyaneus*, *Bacterium Lactis aërogenes*, *Bacillus subtilis*, *Vibrio rugula*, *Bacillus amylobacter*, and *Bacillus megabacterium* (?) The others he designates by the letters A, B, C, D, E, F, G, H, I, as he has not been able to assign them to any previously known or described species. They are the *coccus A*, the *Bacilli B*, *C*, *D*, *E*, *F*, etc., respectively.

be assumed that all bacteria are injurious to the human economy, as many are apt to assume; and secondly, that digestion, both of albuminoids and carbohydrates, is to a considerable extent aided by the diastase which certain microbes secrete; and also by their growth and development, which tend to break up the alimentary substances and favor their transformation. He is of the opinion, however, that very little of the action of these microbes goes on in the stomach, because in the normal state the food remains in its cavity for too short a time for their work to be completed, but when carried with the chyme into the intestine they find here more favorable conditions in the longer exposure and the slight alkalinity of the surrounding media.

The ordinary fæcal discharges from the bowel consist in part of bacteria and their products, and in part of the undigested residue of the food, which is variable, but small in comparison with the quantity of soft semi-solid secretion of the glands of the large intestine. Judging from the physical and chemical characters of this excretory substance, we can readily believe that these glands play a very important part in the economy, and that they perform a very important function. It is a matter of observation and deduction, that when their secretion is deficient it seriously affects the general health, both physical and mental. In fact, many supposed cases of biliousness, torpid liver, etc., are due either to deficient action of these

glands, or to re-absorption of their excretory principles, such as phenol, indol and skatol. The necessity for regular daily evacuation of the bowels is also evident from the fact that the liver, as shown by Schiff and Traube, performs a similar important function in separating poisonous substances from the blood; and, as shown by Taylor in a case of arsenical poisoning, the mucous membrane of the stomach and small intestine also act as channels for the discharge of poisons from the system. Bouchard found that the poisonous activity of human fæces is very great, and asserted that the alkaloids formed in the intestine of a healthy man in twenty-four hours would be sufficient to kill him if they were all absorbed and excretion stopped.

The general health may, therefore, be injuriously affected by the absorption of products of excretion and waste, or by poisons accidentally present in the alimentary canal. In cases of delayed or disordered digestion, the microbes of fermentation and putrefaction accidentally taken in with the usual food and drink, or inhaled into the upper air passages and swallowed with the mucus, find conditions favorable for their multiplication; and as the result the food may undergo the lactic, butyric or acetic fermentation with the evolution of large quantities of hydrogen or carbonic acid gas. Associated with this is the appearance of substances like butyric acid, which give rise to pain in the stomach and œsophagus (cardialgia, heartburn), nausea, eructa-

tions of gas or of the contents of the stomach (pyrosis, water-brash), and vomiting of a sour, perhaps, yeasty fluid. The immediate cause of these symptoms is now well-known. It was indeed shrewdly surmised by Abernethy, who said, that "civilized man eats and drinks an enormous deal more than is necessary for his wants or welfare. He fills his stomach and bowels with food which actually putrefies in these organs." This is undoubtedly true of the class of men that this able, though eccentric, physician had in mind, but it is by no means true of all dyspeptics. Many who are gross feeders appear to suffer singularly little in proportion to their excesses, while others nearly starve themselves without escaping from their torments.

In fact, indigestion is not the reverse of digestion, but a modification of the normal process brought about by the action of bacteria, some of which are constantly present in the stomach but under normal conditions are not active. Abnormal conditions (the most important of which is deficiency in the quantity or alterations in the quality of the gastric juice and other digestive fluids), permit or favor the growth of these organized ferments and the well-known symptoms follow as a natural result. Indigestion, consequently, does not necessarily result from partaking of indigestible food. On the contrary, Boussingault and others have shown by experiments upon animals, that digestion is actually facilitated by mingling considerable proportion of waste material

such as cellulose, etc., with the food, and that a too-concentrated diet not only does not agree so well with the stomach, but it also is not assimilated to so great an extent as one which contains a larger proportion of otherwise objectionable indigestible substances. This accords with the complaints often made by patients that they cannot eat rich food, while coarser articles, such as Graham bread, may give them no trouble in disposing of them. Even milk which is usually regarded as not only a highly nutritious but indeed a perfect food, contains some waste, for much of its casein normally passes through the bowels without being digested in infants, according to Eustace Smith.

The presence in sufficient amount of normal digestive fluids is, therefore, a factor of greater importance than the quantity or quality of the food, if considered in relation to the manner of production of dyspepsia and disordered digestion ; and the mere presence of bacteria in the stomach is of little consequence, unless circumstances favor the development of microbes especially connected with the processes of fermentation and putrefaction. When the conditions favorable to such bacterial development are present, peculiar phenomena will appear such as flatulence, heart-burn, nausea, foul stomach, pyrosis, vomiting, etc., which are usually recognized as symptoms of indigestion. Finally, the development of various forms of bacteria is accompanied by the appearance of toxic products, which in their physiological effects resemble vegetable

alkaloids, such as atropine, muscarine, coniine, etc., and which if absorbed in sufficient quantity will produce death, or in smaller quantity induce various disturbances of health such as are usually attributed to dyspepsia.

SYMPTOMS AND FORMS OF DYSPEPSIA.

From the preceding chapter the writer's views as to the nature of dyspepsia may be inferred. By many the term has been simply considered a synonym for imperfect or difficult digestion, the name tending to perpetuate this view. Others, in seeking a pathological basis for the affection, regard it as the result of various local disorders by which it is usually accompanied, such as gastric catarrh, chronic gastritis, etc. A few seem to consider the title unnecessary, and in some of the principal text books it is scarcely mentioned. Clifford Albutt, indeed, goes so far as to declare it a meaningless, even an absurd term, a mere refuge for ignorance where the real pathological character of the case is not understood. It must be admitted that this criticism is not entirely undeserved, or unjust. It requires keen diagnostic insight in some cases to decide whether the very evident disorder of digestion is itself a symptom of some organic affection, or really the *fons et origo mali.* It is very hard to tell sometimes what is going on in the pit of the stomach, but this is one of the cases where

> "Old experience doth attain,
> To something of prophetic strain"

and while cases of idiopathic dyspepsia may be numerous early in our medical career, we find them growing rarer as we learn to recognize more clearly

the attendant pathological conditions. At the same time, it must not be forgotten, that disordered digestion leads to secondary changes in the stomach such as increased secretion of mucus, dilatation, irritation, possibly inflammation or gastric ulcer; and diagnoses of catarrh, chronic gastritis, dilated stomach etc., should not be allowed to exclude disordered digestion from the diagnosis or treatment. In fact functional disorders of the stomach and organic disease, bear definite relations to each other and are mutually causative; disorder if continued causes morbid states or lesions, and these when present are always accompanied by more or less functional disorder. Therefore, the distinction usually sought to be made be-made between symptomatic dyspepsia and idiopathic or functional dyspepsia can only rarely be made, as they are not mutually exclusive.

Dyspepsia seems to have become so established in the language of the people—it is as "familiar as household words"—and seems so properly to fill its place, that it cannot now be dispensed with, even if we wished to drop it from our vocabulary. It was originally introduced into medicine by Vogel * as a synonym for delayed digestion or bradypepsia. Cullen afterwards adopted it in his nosology, and gave it a wider meaning, by classing it with the Neuroses among the Adynamia. At present the word is used rather

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* Mason Good stated that Vogel took it from Aretæus.

loosely, at one time as applied immediately to gastric disorder, at another as denoting a peculiar adynamic condition of the system which is liable to suffer severely from slight transgressions in diet, *i. e.*, a depraved state of health; and physicians often use it in these different significations. It would be better to return to Cullen's definition and reserve the term dyspepsia for the general state of ill-health, or the constitutional symptoms preceding, accompanying, or following digestive disorders; and to more carefully diagnosticate our cases. Whenever it is possible to recognize an underlying morbid state of the stomach we should do so. In many cases this will not be possible and we will be forced to accept the conclusion, so ably advocated by Fothergill, that some patients have weak digestive organs just as others have weak lungs, or inadequate liver and kidneys.

Taking the ground that dyspepsia is, though not distinctly a neurosis, still a systemic disturbance, we can omit from present consideration, those symptoms which belong directly to disorder of the digestive organs which have been already referred to. The general symptoms most frequently observed in cases of dyspepsia are:

1. Pain, distress and discomfort, which may be most marked over the epigastrium, or in the back between the shoulder-blades, in the head, in the heart, lungs or bowels, in fact in any portion of the body. A peculiar feature with regard to these pains is, that

they may not be associated with local evidences of disorder; the patient may even be unwilling to believe that he has dyspepsia, until proper treatment relieves him of his lumbago or rheumatism as he is apt to call it. A common place to be attacked is in the left arm, which may feel heavy and numb; the pain may be excited by muscular movements, or occur independently of them; and there may be tingling of the fingers and hand which the patient believes is the fore-runner of paralysis.

2. Nausea, or a feeling like sea-sickness (from *ναυς*, a ship) occurring equally after eating and when the stomach is free from food; in either event some relief is experienced when vomiting occurs, which is not always the case. The contents of the stomach, consisting largely of partially digested food and of mucus, vary in character greatly; they may be acid, bitter, sweetish, foul, yeasty, or tasteless and clear. When vomiting is prolonged (retching), it is not uncommon to find some bile mixed in the mucus brought up at the last. (A patient came to the writer in great alarm stating that a doctor had told her that she "had a bile on her stomach," he probably referred to the hepatic secretion, she understood by it a boil, the consequences of which in the stomach she was unable to comprehend, but thought they must be something serious).

3. Vertigo, or swimming in the head, is one of the most unpleasant of the common symptoms of dys-

pepsia. The kind of vertigo is that termed objective, in which the patient himself appears to be at rest while surrounding objects revolve around him; it is partially though not wholly relieved by closing the eyes. Subjective vertigo also occurs, though rarely.

4. Hemicrania or migraine is very apt to afflict dyspeptics. It is unlike ordinary pain in the head produced by indigestion, as it does not come on at once but on the day following the indulgence which causes it. As the name implies it is worse upon one side of the head than the other. This headache is associated with nervous prostration and vertigo, and is very likely to terminate after a few hours in vomiting; hence the common name of "sick-headache." Such attacks are often preceded by a constipated condition of the bowels, leading to the conclusion that they are connected with, or dependent upon, retention or reabsorption of excrementitious principles or of ptomaines from the contents of the bowel. This is rendered probable by the effects of blue pill in preventing attacks, and of caffeine in relieving them. A curious modification of migraine occasionally appears as hemiopia, where, after some gastric indulgence, the patient finds himself only able to see one vertical half of an object in front of him, or of his own reflection in the looking-glass. Like the preceding, this form usually lasts only a few hours but is sufficiently alarming while it continues.

5. Various nervous phenomena more or less

paroxysmal in character, such as cough, asthma, twitching of eye-lids, and epileptiform convulsions especially among children, are occasionally observed. Chorea may be excited in this way.* Patients sometimes have abnormal sensations in different parts of the body as of a hair in the throat, or an animal in the stomach; and a case is mentioned by Leared where a patient had a peculiar sensation in the urethra, like a foreign body. Stomach-cough usually is sudden and short, and unaccompanied by expectoration.

6. Palpitation of the heart and cardiac pain are common symptoms of flatulent dyspepsia. The suffering "when the wind gets around the heart" is very suggestive of angina pectoris. The relations of the pneumogastric nerve with both stomach and heart sufficiently explain the nervous connection. After an indigestible meal, the patient may be wakened from sleep by irregularity of the cardiac beat; the pulsations are at first very rapid then become slower, fuller, and even painful, as the apex thumps against the ribs so hard as to shake his whole body, or even the bed upon which he is lying. The interval between the beats increases until the patient fears that it will stop altogether, then palpitation again occurs, and this may go on for several hours. Ordinarily, however, the palpitation, or rapid beating, with some pain or

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* For case see clinical lecture by the author in the *Medical Register*, Vol. v, p. 289.

soreness in the chest and shortness of breath on exertion, is all that the patient complains of, but it is often difficult to convince him, that his heart is sound and that it is all due to functional derangement of his stomach. Very often the diagnosis is complicated by the effects of tobacco or alcohol, and a condition of gastric catarrh or chronic gastritis. Throbbing of arteries is very common, and if the skin be dry and hot this may be mistaken for fever. The pulsations of the abdominal aorta are sometimes so marked as to lead to the suspicion of aneurism.

7. Muscular weakness, or a feeling of worthlessness, especially in the morning, is frequently encountered in dyspeptics.

8. A condition of mal-nutrition of the body is typical of one class of dyspeptics. M. Peter believes that this frequently precedes and is prone to terminate in phthisis.

9. The functions of the nervous system are often perverted in a strange manner. The patient may be hypochondrical and entertain promptings to suicide. The typical dyspeptic is sensitive, high-strung, and irritable. His own sensations are to him an unfailing source of interest, and observation of his symptoms is for him a congenial occupation, to indulge in which he is always ready to neglect his other work. Aberrations of sight, such as dimness of vision, specks before the eyes (muscæ volitantes), flashes of light, or actual spectra, partial deafness or tinnitus of various forms

(ringing of bells, beating of drums, escaping steam, strains of music), all may result from dyspepsia.

10. Other functions, such as those of the sexual organs, or of the liver, or the kidneys, may be impaired in dyspepsia, and here cause and effect are so involved that it is often difficult to decide whether dysmenorrhœa, leucorrhœa, ovarian pain, etc., are due to the dyspepsia, or the reverse. Indeed, as Clifford Allbutt has suggested in his admirable lectures upon the "Visceral Neuroses," they may equally be parts of a general depravation of the bodily force, largely the result of bad heredity and defective development.

It is important to examine the urine in dyspepsia, because information gained from the chemical and microscopical reports may throw important light upon the nature of the case. Thus a deficiency of urea, or a low specific gravity due to excess of water, is apt to occur in one class of patients, in another there is real or apparent excess of urea and urates, and a deficiency of water. The oxalates, although not accorded the value that was originally given them by Prout, are still of some clinical importance, because when persistent they indicate a deficient supply of oxygen. An alkaline state of the urine is common, with a deposit of phosphates, attending imperfect digestion; hyper-acidity of the urine often accompanies an acid condition of the stomach. Occasionally small amounts of sugar or albumen (or peptones) are found after indulging in certain articles of food

such as figs, raisins, maple-sugar on the one hand, or eggs and highly albuminous food on the other. When this is unaccompanied by other evidence of diabetes, or of renal degeneration, it may be ascribed to indigestion, but such cases require to be seen from time to time, lest the more serious disease should develop. Careful and repeated clinical and microscopical examination can alone separate these cases from others in which the dyspepsia itself is only a symptom of the cirrhotic kidney of chronic Bright's disease.

Among the peculiar effects of dyspepsia is a sense of weight or fatigue in the lower limbs which soon becomes painful, and calls for a change of position, when it passes away. This has been mistaken for the fulgurant pains of locomotor ataxia. Alterations, in sensation are common, among which according to Leared, is the fancied unnatural size of some portion of the body, which generally comes on at night and disappears after moving the part, and after reflection corrects the erroneous impression. Sleeplessness is not uncommon, but unrefreshing sleep accompanied by frightful or depressing dreams is more frequent. The patient may even dread falling asleep on account of the nightmare that awaits him, with dreadful falls or conflicts, with enraged monsters, or severe manual labor like that of Sisyphus, which leaves him aching in every muscle. He may shout, or even walk in his sleep. In the form of dyspepsia common in gouty subjects, grinding the teeth is common, and

if the habit is once formed it may survive the loss of the teeth, and the patient with a double set of artificials continues the grinding or gritting of the teeth, with peculiarly disagreeable effect upon persons in his vicinity endowed with sensitive nerves.

Various eruptions of the skin are symptomatic of dyspepsia, among these are eczema, acne, certain papular eruptions and especially urticaria. Among the articles most likely to produce nettle-rash, are oatmeal, cucumbers, mush-rooms and shell-fish. In one case within the writer's knowledge, raspberries, or even substances flavored with this fragrant fruit, always caused this eruption within a few minutes. Mackerel, herring, or lobster,cause an eruption in some; vinegar may cause it in others. This list might be extended, but enough has been said to show the relation between certain articles of food and skin-diseases, and to draw attention to the correction of the digestion in many such cases as an indispensable pre-requisite to the successful treatment of the eruption.

Rosenthal in his "Gastric Neuroses and Gastric Catarrh," directs special attention to the rôle of the nervous system in visceral pathology and especially in affections of the stomach, in opposition to the prevalent chemical theory of dyspepsia. Clifford Allbutt, Leyden, Ewald, and others have also contributed towards establishing the view that failure of digestive power is part of a general process, and is associated with other recognizable evidences of functional in-

capacity (dysmenorrhœa, etc). We should, therefore, look beyond the stomach in our investigation and treatment of a case of dyspepsia. It is not implied that local disorder may not also be present, for anything which weakens or retards digestion reduces the antiseptic quality of the gastric juice; and, therefore, will directly favor the development in the stomach of microbes of fermentation, of lactic, butyric, acetic or of other special forms. Sour stomach may also exist, it is true, from temporary causes; but when habitual, it constitutes a well-recognized feature of dyspepsia. Thus we might distinguish (1) an asthenic dyspepsia, (2) an infective dyspepsia, and most commonly (3) a mixed form in which both elements can be recognized, each demanding appropriate treatment.

Temporary disorder of digestion may occur at any time, from a want of proper relation between the food and the stomach (excess, indigestibility, incompatibility, idiosyncrasy, etc.), or interference with the process (by physical exercise after eating, violent emotions or mental influence, exposure to cold, etc.). It is only when this becomes the rule and not the exception, that the patient is said to have dyspepsia. This diagnosis, is correctly applied only to those cases in which the habitual disorder of digestion is the principal or primary affection. In other words, indigestion may be due to lesions of the stomach or accompanying general diseases, like the pyrexiæ, in which case it is to be considered as a part of the organic affection.

Hence the classical distinction between idiopathic (or functional), and symptomatic dyspepsia. By the limits of the present discussion, and the views just expressed, the latter is necessarily excluded, and the former is to be understood whenever the term dyspepsia is used. A proper and practical distinction, is then to be drawn between dyspepsia and disordered digestion, which in effect is the distinction between a disease and a symptom. Indigestion and biliousness, frequently result from derangement of the liver, especially in the condition of the system known as lithæmia, in which there is deficient elaboration of the nitrogenized principles of the food, and as pointed out by J. Milner Fothergill, the symptoms are usually removed by the adoption of a farinaceous dietary. In this case also the digestive disorder might be said to be only symptomatic of the real defect of the liver. In a similar manner the gastric symptoms accompanying Bright's disease of the kidneys, uterine disease (including pregnancy) or locomotor ataxia and other spinal affections, are often erroneously attributed to dyspepsia. As already said, Clifford Allbutt* severely criticises the loose manner in which the diagnosis of dyspepsia is usually made. He insists that dyspepsia instead of being a common disease, is indeed a rare one, cases of dyspepsia having been entered upon his note-book each year with

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*Gulstonian Lecture on "Visceral Neuroses," London, 1884.

diminished frequency as his ability to recognize the underlying lesions causing the symptoms has increased. One of the most common causes of digestive disorder is inflammation of the stomach, accompanied by excessive secretion of mucus, forming clinically what is usually termed gastric catarrh or catarrhal gastritis. This condition which is most commonly met with as the result of errors and excesses in eating and drinking, is, with its attendant symptoms, almost universally mistaken for dyspepsia.

Dilatation of the stomach is also attended by digestive disorder, and may be confounded with true dyspepsia, although the diagnosis is easily made.* The relatively large quantity of material vomited, indicating greatly increased capacity of the stomach, will generally attract attention and suggest the existence of dilatation of the organ. Yeasty vomiting, the vomited matter containing bacteria and sarcinæ, also is a frequent symptom of this condition.

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*Zweifel has proposed a novel means of diagnosis of stomach affections. He uses iodide of potassium in gelatin capsules. If the stomach is empty and healthy the iodide will appear in the saliva in 10 minutes. If it is delayed beyond 25 minutes "there is every reason to believe that we have to deal entirely with dilatation of the stomach or with cancer of the pylorus, or both together, provided always that the existence of any fresh ulceration has been excluded," which also exerts a retarding influence. "A differential diagnosis between cancer ulcer, and chronic catarrh of the stomach, is not always possible from the rate of absorption alone."

Gastralgia, neuralgia of the stomach, (except when connected with obvious organic disease of surrounding organs, or of the spinal cord, vertebræ, or aorta), may be considered as a functional disorder, and in some cases at least it is a form of dyspepsia. But it is more frequently the expression of gout or malarial poisoning, in which case it is apt to recur at regular periods, and is less affected by taking food than the dyspeptic form is. What is called gastralgia is often colalgia. Gastric ulcer generally is revealed by a burning or lancinating pain coming on immediately after swallowing food, which is aggravated by certain articles such as acids. Hæmatemesis may occur, but this is not always the case; not only may this classical symptom be absent, but in a considerable proportion of cases the gastric ulcer is latent, and may run its entire course to cicatrization without affording any evidence of its existence, beyond the ordinary symptoms of dyspepsia. The existence of a gastric ulcer may, however, be suspected if pain seems to radiate from a certain point in the epigastric region, and when upon deep pressure tenderness is detected at a particular place in the wall of the stomach; or, indeed, the vomiting of blood may be the first symptom.

Hysteria may simulate gastric ulcer, but is more frequently found associated with it, owing to the fact that young women are the most frequently affected. One difference to be noted is that in hysteria the

hyperæsthesia is cutaneous rather than gastric, the slighest touch to the surface of the epigastrium causing the patient to writhe in pain, which is not proportionately increased by deeper pressure. Peter asserts that the surface temperature of the epigastrium is elevated above the normal in ulcer, but not in nervous gastralgia. The following table * may assist in the diagnosis :

NERVOUS GASTRALGIA.	GASTRIC ULCER.
1. Pain is often independent of the ingestion of food, and may often be relieved by the taking of food.	1. Pain is mostly dependent upon taking food, and its intensity varies with the quantity of the food.
2. Pain is often relieved by firm pressure.	2. Pain is increased by pressure.
3. Pain is rarely relieved by vomiting.	3. Pain after a meal is usually relieved by vomiting.
4. Fixed points of tenderness and of subjective pain, not usually present.	4. These are often present.
5. Relief is usually complete between the paroxysms.	5. Some pain often continues between the paroxysms.
6. Nutrition is frequently well preserved.	6. Nutrition usually affected.
7. Usually associated with other nervous affections, such as hysteria, neuralgia in other places, ovarian tenderness.	7. Neuropathic states less commonly present.
8. Benefitted less by regulation of diet than by electricity and tonic treatment.	8. Benefitted, not by electricity but by regulating diet.
9. Not followed by dilatation of the stomach.	9. Dilatation of the stomach may supervene.

* Dr. W.H. Welch, Article on "Simple Ulcer of the Stomach." Pepper's *System of Medicine*, Vol II, page, 516.

But these are not without exception, even in a single instance; and when, as sometimes happens, an ulcer is associated with nervous gastralgia, the diagnosis cannot be made. As Welch states, "a diagnosis of purely functional gastralgia has been repeatedly overthrown by the occurrence of profuse hæmatemesis." The diagnosis is of special interest and importance when the ulcer may be malignant; in some cases the difficulty is so great that, with ordinary means, it is impossible, during life, to decide with certainty between the existence of gastric ulcer and gastric cancer. The following table* (page 32), also from Welch, places in contradistinction the clinical features of these when compared with chronic catarrhal gastritis.

The differential points in the table are of very unequal value, and not one is characteristic. The most that can be said is that in simple dyspepsia there is no gastric hæmorrhage; it is rare in gastritis, and at an age under thirty, profuse hæmorrhage and absence of tumor are the most important points in favor of an ulcer; tumor, advanced age, and coffee-ground vomiting continued for weeks, are the most important points in favor of cancer. Chronic interstitial gastritis or fibroid induration of the stomach, cannot be distinguished with any certainty from cancer of the stomach.† As regards tumor, when it ex-

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* *Loc. cit.*, p. 570.

† Welch, *loc. cit.*, p. 57.

	GASTRIC CANCER.	GASTRIC ULCER.	CHRONIC CATARRHAL GASTRITIS
1	Tumor is present in ¾ of the cases.	Tumor rare.	No tumor.
2	Rare under 40 years of age.	May occur at any age after childhood; over ½ of the cases occur under 40 years of age.	May occur at any age.
3	Average duration about one year, rarely over two.	Duration indefinite, may be for several years.	Duration indefinite.
4	Gastric hæmorrhage frequent, but rarely profuse; most common in the cachectic stage.	Less frequent than in cancer, but oftener profuse, not uncommon when the general health is a little impaired.	Gastric hæmorrhage rare.
5	Vomiting often has the peculiarities of that of dilatation of the stomach.	Vomiting rarely referable to dilatation of the stomach, and then only in a late stage of the disease.	Vomiting may or may not be present.
6	Free hydrochloric acid is usually absent from the gastric contents in cancerous dilatation of the stomach.	Free hydrochloric acid usually present in the gastric contents.	Free hydrochloric acid may be present or absent.
7	Cancerous fragments may be found in the washings from the stomach or in the vomit (rare).	Absent.	Absent.
8	Secondary cancer may be recognized in the liver, the peritoneum, the lymphatic glands, and rarely in other parts of the body.	Absent.	Absent.
9	Loss of blood and strength, and development of cachexia, usually more marked and more rapid than in ulcer or in gastritis, and less explicable by the gastric symptoms.	Cachectic appearance usually less marked and of later occurrence than in cancer, and more manifestly dependent upon the gastric disorder.	When uncomplicated, usually no appearance of cachexia.
10	Epigastric pain is often more continuous, less dependent upon taking food, less relieved by vomiting, and less localized, than in ulcer.	Pain is often more paroxysmal, more influenced by taking food, oftener relieved by vomiting, and more sharply localized, than in cancer.	The pain or distress induced by taking food is usually less severe than in cancer or ulcer; fixed points of tenderness usually absent.
11	Causation not known.	Causation not known.	Often referable to some known cause, such as abuse of alcohol, gormandizing, and certain diseases, as phthisis, Bright's disease, cachexia of the liver, etc.
12	No improvement, or only temporary improvement, in the course of the disease.	Sometimes a history of one or more previous similar attacks; the course may be irregular and intermittent; usually marked improvement by regulation of the diet.	May be a history of previous similar attacks; more amenable to regulation of diet than is cancer.

ists we cannot be sure that it is cancer, and cancer may exist in an infiltrated form without tumor.*

In all cases of examination for abdominal tumor, it is essential that it shall be preceded by the administration of a purgative cathartic.

A cancer that does not obstruct either orifice of the stomach, may pursue a course for a time absolutely without symptoms, as far as the stomach and its functions are concerned; and it may be accepted as a fact that in any case a diagnosis of the particular form of cancer cannot be determined. In any doubtful case the test of the contents of the stomach for free hydrochloric acid should be made, as the weight of evidence goes to show that absence of this acid is a very important diagnostic sign of carcinoma. The tests are performed as follows:

1. To a weak aquæous solution of methyl-violet in a test tube, add a portion of the filtered gastric contents. The violet color becomes distinctly blue if HCl be present. This test is delicate for one and one-fourth parts HCl in one thousand of the filtrate.

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* The mere presence of a tumor is almost without value in making the differential diagnosis between cancer and stenosis. Among 24 recorded cases, a tumor was present in 7, absent in 4, and not noted in 13, by Dr. J. M. Barton, "Digital Divulsion of the Pylorus for Cicatricial Stenosis," *Times and Register*, May 25, 1889.

† J. P. Crozer Griffith, Philadelphia *Medical Times*, Vol. xvii, p. 480.

2. Make a mixture of an aquæous solution of the sesqui-chloride of iron and a very concentrated solution of carbolic acid: the quantities are best determined by experiment. An amethystine-colored fluid is produced, which becomes bright yellow when added to the filtrate, if lactic acid be present. This test-fluid must always be freshly prepared. The reaction is delicate for one-half of a part in one thousand.

The peptic strength of the gastric juice may also be tested in the usual way with coagulated egg-albumen, as Riegel * claims that, besides the almost constant absence of HCl in the gastric juice in cancer of the stomach, the peptic strength is deficient. The contents of the stomach six or seven hours after a meal are used for the testing, after removal by a stomach-tube. Or the stomach may be washed out with a little cold water. In a patient of Débove's, the absence of hydrochloric acid enabled a diagnosis of cancer to be made at a period when there was no other symptom of the disease, and when the case was looked upon as simply dyspepsia.

The gastroscope, invented by Mikulicz, may afford some information as to the appearance of the gastric mucous membrane, but as yet it has not been presented in a form adapted to general use.

The appearance of the tongue is in itself of little

**Zeitschrift für Klin. Med.*, B. xi, H. 2 and 3.

consequence, as dyspepsia may be present in severe form while the tongue is clean and moist; on the other hand there are many persons in all respects free from stomach disorder, in whom the tongue, especially on rising in the morning is habitually foul. A coating upon the tongue is often caused by decayed teeth, enlarged tonsils, naso-pharyngeal catarrh, etc. A swollen tongue showing the impressions of the teeth upon its surface, which may or may not be fissured and coated, may indicate chronic gastric catarrh. The following are some of the well-marked conditions of the tongue connected with dyspepsia as given by Leared. An unnaturally red condition of the organ is caused by deficiency in its epithelial coating and indicates the same condition of the internal coating of the stomach. The redness is usually most marked at the tip; and when the papillæ situated there are prominent, its resemblance to a red strawberry is striking. As a symptom, no condition of the organ is more reliable than this. An irritable condition of the stomach, as further proved by tenderness on pressure at the pit, loss of appetite and thirst, are generally associated with this strawberry-like tongue. When the back part of the tongue is smeared with a creamy-white or yellowish coating, a foul state of the gastro-intestinal tube is indicated. A brown tongue is more generally associated with indigestion from temporary excess than with the habitual disorder. When the tongue is broad, flabby, and pale, it indicates an anæmic and

debilitated condition of the whole system accompanied by weakness of digestion. Extreme enlargement of the large papillæ at the back of the tongue indicates severe and long-existing dyspepsia. Aphthous patches on the tongue or mouth are usually connected with acid stomach and a tendency to gout. These should not be mistaken for mucous patches, or "milk-spots" occurring in the same locality in the secondary stage of development of the specific disease.

From the above brief outline of the symptoms of dyspepsia and of some of the diseases most resembling it, we see that the diagnosis is only to be arrived at by a process of exclusion. There are no symptoms pathognomonic of dyspepsia, but, in the absence of evident lesion, the symptoms are sufficiently characteristic of the disease to enable us to make the diagnosis with sufficient approach to certainty.

To summarize: the phenomena may be divided into local and general. The *local symptoms* are a sense of weight, or actual pain and discomfort after eating, marked disorder following even moderate indulgence in unaccustomed or indigestible food, or in special articles of diet which to others are usually harmless. As remarked by Leared, it is incorrect to assume, as is sometimes done, that these sensations depend exclusively upon delay in the reduction of solid food to chyme, although this is often a not unimportant factor. But the same symptoms are occasionally observed after partaking of a liquid food, and may be even caused by

simple water. Flatulence, and eructations of gas, may exceptionally occur, independently of fermentation, but they usually indicate the occurrence of microbic infection. Nausea and vomiting may be present, but in many cases they are absent. The bowels are usually constipated and the excreta scanty.

The *general symptoms* are numerous. Pain may appear in any part of the body, but especially in the vicinity of the cardiac region, so that patients with dyspepsia frequently complain of pain in the heart or "wind around the heart." Irregularity of action of the heart may also be produced by the reflex influence of laboring stomach upon the cardiac ganglia through the the sympathetic or the pneumogastric nerves. Aching between the shoulders, and painful numbness of the left arm are common symptoms of dyspepsia. The headache is of every degree of severity and variable in description. Intolerance of light and noise is often noted, and "increase of pain on stooping is peculiarly a feature of dyspeptic headache." (Leared). Subjective vertigo, or a sense of swimming in the head not relieved by closing the eyes, is very apt to be due to gastric disorder. In acid dyspepsia a sense of burning at a particular spot in the head, as at the vertex is often complained of; occasionally there is a sense of oppression as if an iron cap had been forced on the head.

The protean manifestations of dyspepsia are ad-

mirably summarized by Da Costa.* They consist mainly, in the words of this distinguished clinical teacher, "of the phenomena of indigestion but in infinitely varied combination; in some cases we find pain; in others nausea and disgust for food; in others, again, uneasiness after meals, and acid eructations, or flatulency; in some the gastric symptoms are connected with debility, with great depression of spirits and with wasting; in others, a fair amount of health is preserved; the appetite is uncertain or perverted, and the signs of indigestion are manifest only after certain articles of food have been partaken of; in some cases the nervous symptoms are more prominent than the gastric; in others the dyspeptic may be the most marked, although the real cause is an exhausted state of the nervous system."

In concluding this consideration we may say that if dyspepsia consisted essentially in defective digestive power, unaccompanied, or at least not due to any local or general organic disease, it might be as in the nosology of Cullen, placed among the neuroses in the class adynamia, or in modern fashionable terminology it might be considered a form of neurasthenia; but this would be a too restricted view to take of a disease which is a vice of the whole organism and not limited to any one system. If the nervous

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* *Medical Diagnosis*, Sixth Edition Revised, Philadelphia, 1884, p. 485.

system is poorly nourished, then the blood may justly be indicted for general unfitness; and if impoverishment of the blood is assigned as the real *causus morbi*, we are at once referred to the digestive organs and blood-making structures whose neglect of duty brings other evils in train; and they in turn may be excused on the ground that they are starving for the want of proper innervation and healthy blood. This was insisted upon by Eberle as one result of his studies of normal and artificial digestion. "In truth we are daily witnessing the fact that an ill-nourished stomach is in no condition to form and separate active gastric juice. Diseases which do not directly affect the stomach, but alter the quantity or crasis of the blood, the nervous system, etc., and induce defective nutrition of the gastric tissues, bring about abnormalities in the formation and the secretion of the gastric juice."*

Thus there is a vicious circle of mal-nutrition in which it is impossible to point out any special organ or function as principally at fault, but it must be regarded as a failure of the organism as a whole rather than any part.

That certain organs of the body, owing to natural defect or to want of development, may not be fully

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* *Physiologie der Verdauung nach Versuchen auf Natürlichem und Künstlichem Wege*, Von Dr. J. N. Eberle, Wurzburg, 1834, p. ix.

up to the standard in the performance of their functions, is acknowledged in the term "congenital inadequacy of the liver," "renal inadequacy," or that condition of "pulmonary vulnerability" which marks the subject especially as a victim to phthisis. In the same manner we may recognize in a certain proportion of cases of inherited dyspepsia, a "congenitally inadequate" stomach. With proper care as regards the diet and general health, such individuals may live their allotted time and even enjoy life, although gastronomic excesses are forbidden under severe penalties. Such a state of affairs is not without its compensation, since a too vigorous digestion is a fatal possession for elderly patients given to the pleasures of the table, at a time when the arteries are becoming brittle. Under such circumstances a spare diet is favorable to longevity, while a full diet by producing plethora invites apoplexy, gout and various inflammatory diseases of the lungs or other internal organs.

The fact that stomachs vary in digestive capacity, though a well established one, and known to Hippocrates,* is not taken into account in treatment of gastric disorders as much as it should be.

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* "Such constitutions as suffer quickly and strongly from errors in diet, are weaker than others that do not; and a weak person is in a state very nearly approaching to one in disease." "Therefore, it appears to me necessary for every physician to be skilled in nature and strive to know, if he would wish to perform his duties, what man is in relation to the articles of

Dr. Chambers, says "By far the most easily proved cause of deficiency of gastric juice is hereditary predisposition; there is no defect, moral or physical, so frequently handed down from parent to offspring as the inability to form a sufficiency of this secretion; no 'family failing' so common as the symptoms assigned to it in these pages. He also observes that digestive capacity may be acquired as well as inherited: "Of external causes the commonest is overwork of mind; long continued anxiety, ambition, hard study, and in short, any employment which calls for the continuous application of the intellect or the passions in one direction, induces more frequently than anything else the train of phenomena ascribed to this deficiency. For this reason it is a complaint found among the busy hum of men rather than in the calm peace and quiet of the rural districts; rather among classes who contribute the fruit of their brains, than of those who offer the sweat of their brows to the common stock of labor. Next to mental work comes gluttony, and next to gluttony drunkenness, as similar causes of the too early wearing out of the excitability of the gastric nerves and consequent defect of secretion."*

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food and drink, and to his other occupations, and what are the effects of each of them to every one." *Hippocrates.* "*On Ancient Medicine,*" *Sydenham Society's Translation.* London, 1869.

*Thomas King Chambers on *Digestion and Its Derangements.* London. 1856.

THE TREATMENT OF DYSPEPSIA.

The treatment of dyspepsia, in the light of what has been said, must be largely palliative. "Once a dyspeptic, always a dyspeptic." And yet there are degrees even of dyspepsia, and relief from the aggravated forms is often so grateful to the patient that he is only too willing to consider himself fully cured and laud the latest remedy as the specific. In truth, drugs have a secondary place in the treatment of this condition, although their value, both in palliating the patient's sufferings and in aiding the stomach to perform its duties, must be acknowledged.

1. *Hygienic Treatment.*—In the first rank in the treatment of dyspepsia must be placed such hygienic measures as improve the general health. Horseback riding, walking, driving, gymnastic exercises, especially such as are carried on in the open air, are very useful. The marked improvement experienced after a day's tramp through the woods on a fishing excursion, or after walking all day over the stubble with dog and gun, is not confined to the mere sensation of well-being, but is attended by increased appetite and increased capacity for digesting food. Under such circumstances, there is not only more of the gastric fluid poured out, but the pepsin is demonstrably of better quality than when the patient is at home following some sedentary occupation. Ventilation is of great importance: the living rooms should be aired

daily, and the sleeping rooms should have some free communication with the external air by a partially opened window. If the neighborhood is too malarial to permit this, it is a dangerous one to live in at any time.

As there is a relationship and sympathy between the external and internal integument, the skin and mucous membrane, the surface of the body should be duly cared for. The use of a flesh-brush each morning, followed by a cold sponge bath, quickly performed, has a remarkable influence upon the stomach, and generally induces an appetite for breakfast. Some light gymnastic exercises, without apparatus, early in the morning, will also be of great benefit to persons of sedentary habits, although nothing will take the place of exercise in the open air, where the nervous system is stimulated by the actinic rays of the sun.

The necessity for attention to the diet is so impressed upon the mind of the dyspeptic, that he is in danger of eating everything twice, digesting it in his mind before it enters his stomach. In his despair he may abandon one article after another, until he is reduced to the most meagre diet, and even then his dyspepsia clings to him like the Old Man of the Sea to Sinbad. In such cases the patient often needs to be told how to live, rather than what he may eat. Let him learn to digest with his muscles; or with his legs, as Chomel advised in cases of diabetes. When he learns that

there is no royal road through a pharmacy to a plough-boy's appetite and digestion, he will understand the parable of Æsop of the Rich Man who envied the Cobbler. For a man to be as hungry as a hunter, he should apply to Nature's laboratory for his tonic rather than to the corner drug-store. If the dyspeptic lives rationally, he will not find much difficulty, if any, in eating ordinary properly prepared food, with the exception of probably a few articles, which experience will teach him are not acceptable to his stomach. Some of the principles of dietetics, in detail, will be considered in the concluding section of this book. To sum up the hygienic treatment of dyspepsia: the patient must have each day a certain amount of outdoor exercise, preferably on horseback or by walking. He should have a sponge- or shower-bath with friction of the skin each morning before breakfast. He should sleep in a ventilated room. His mind should not dwell upon his symptoms, or his food, but should be diverted by some form of recreation. In short, by leading a well-conducted life without excesses, he may ignore his dyspepsia. The Code of Health of the ancient School of Salernum gives the same advice.

> "Fercula sic sapias, et pocula sume morosa,
> Indulgere gulæ caveas, contemne gulosa,
> Vivere morosè studias, fugias vitiosa."

2. *Medical Treatment.*—The abundance of remedies for dyspepsia, proves that there is no specific for this condition. The classes of therapeutic proced-

ures that are most used are tonics, corrigents, irrigation, artificial digestants, eccritics (emetics and purgatives), electricity and massage.

Tonics.—These are used for their local and general effects, but for convenience the local tonics will be considered under the next heading, corrigents, and the general tonics will only be considered here. At the head of the list we place nux vomica and its preparations. The well-known stimulating action of strychnine upon nerve structure, indicates its usefulness where there is defective innervation. It may be given as follows :

℞ Strychninæ, gr. j.
Acid phosphoric; dilut., f ℥ j.
Elixir aurantii, f ℥ ij.
M.

Sig. Give a teaspoonful thrice daily, preferably from two to three hours after eating.

Cinchona is also a valuable systemic tonic, and may be combined with nux vomica :

℞ Quininæ hydrochlorat., gr. ij.
Ext. nucis vomicæ, gr. ¼.
Leptandrin, gr. j.
Ol. cajuputi, q. s.
M.

For a single pill to be taken before meals.

Fothergill highly esteems the following as a dinner pill:

℞ Pulv. ipecacuanhæ, gr. i.
Strychninæ, gr. $\frac{1}{30}$.
Pulv. piper. nig., gr. ij.
Pil. aloës et myrrhæ, gr. ijss.
M. Ft. pil.

One each day.

Strychnine may also be given in granules (gr. $\frac{1}{240}$) but the solution is preferable. The following has been found useful in weak digestion and loss of appetite :

℞ Quininæ sulphat., gr. ij.
Tr. cardamom. co., ℥ viii.
Tr. gentianæ, f ʒ i.
Syr. zingiberis, q. s. ad., f ʒ ij.
M.

To be taken with water, a short time before meals.

In some cases combination with an alkali answers better.

℞ Sodii bicarbonat., gr. viij.
Tr. gentianæ co.,
Tr. cardamom co., ää f ʒ j.
M.

A dessert-spoonful before meals, with water.

A chalybeate may be needed in anæmic cases, but it should not be given when the tongue is very red and clean indicating irritability of the digestive tract. Fothergill says, " There is one condition in which iron is absolutely forbidden, and that is the condition known as biliousness. As long as there is a foul

tongue, a bad taste in the mouth, and fulness of the liver with disturbance of the alimentary canal, iron is to be prohibited ; it is not only that it is of no service, it positively does harm. It aggravates all the symptoms and intensifies the condition.*

The citrate of iron and quinine may be given in pili, or the iron may be given in solution with quassia or gentian, using the potassio-tartrate, the ammonio-tartrate or pyrophosphate, or other soluble ferric salt.

In this connection we may refer to the use of the hypophosphites as general tonics to improve the digestion. Since attention was called by Churchhill to their beneficial influence in depraved nutrition, their use has been almost universal. The U. S. Pharmacopœia has a syrup of hypophosphites containing in each fluid drachm three grains of lime and one each of sodium and potassium hypo-phosphite. The Syrupus Hypophosphitum cum Ferro, contains in addition about gr. $\frac{2}{3}$ of lactate of iron to each drachm, which is the usual dose. The hæmatic hypophosphites (P., D. & Co.) forms a valuable means of administering these tonics, as it contains also a small quantity of manganese. The dose is one or two drachms.

In children the combination with arsenic is serviceable, especially if malaria is suspected.

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* The *Practitioner's Hand Book of Treatment*, 3d edition, Phila., 1887, page 60.

℞ Liq. potass. arsenitis, ♏ i-iij,
Tr. cinchona, f 3 j.
M.

A teaspoonful in water, after meals.

Where there is possible strumous taint, the following (although chemically incompatible) has undoubtable good effects:

℞ Hydrarg. chlor. corrosiv., gr. $\frac{1}{48}$,
Tr. cinchonæ co., ♏ xl,
Syr. aurantii cort., ♏xx.
M.

Three or four times daily.

The bitter wine of iron, or the unofficinal ferrated tincture of elixir of gentian will also be found useful.

Into most of the dyspepsia mixtures, especially the proprietary or patent medicines, "bitters" etc., alcohol enters in rather large proportion, and probably some of the therapeutic effect of tinctures and elixirs are due to this ingredient. This brings us to the question of the use of brandy, whisky, or wine in dyspepsia. Ringer does not hesitate to recommend it, and states that "many dwellers in towns, who lead a sedentary life, and suffer often from weak digestion, find that only by the help of alcohol in some form can they properly digest their food." At the same time that we acknowledge the truth of this observation and

* Handbook of Therapeutics. Tenth edition, New York, 1883, p. 350.

the fact that alcohol temporarily stimulates digestion, we are obliged to state that the constant use even of small quantities of spirits is liable to produce chronic gastric catarrh, and favors the development of liver and kidney disease. Moreover there is reason to believe that some who begin the use of a "little wine for the stomach's sake" soon learn to take it for its own sake, and physicians are liable to be censured when their advice is quoted as an excuse for tippling. For this reason, if alcohol is needed for an emergency, it is better to administer in the form of a tincture of one of the simple bitters, or combined with valerian so as to disguise the taste, and even then with a caution to the patient as to the danger of continuing it too long.

The limits of the present discussion forbid any more extended reference to tonics, many of which have been used to advantage in dyspepsia, such as hydrastis, columbo, cimicifuga or eucalyptus; but after all there are no tonics like sunshine, fresh air, exercise, food, and undisturbed sleep at night.

Corrigents.—When the patient suffers with sour stomach due to excess of gastric juice or acid fermentation of its contents, an alkali is the antidote usually applied; and hence the demand for soda-mint in solution or in tablets. If the pain be severe, and especially if persistent vomiting occur, the following will often relieve:

℞ Potassii, bicarbonat., ʒ j,
Chloroformi, ♏ xl,
Aquæ menthæ viridis, q. s. ad., f. ℥ vj.
M.

Give a tablespoonful every half hour until vomiting ceases.

Powders of bismuth and soda, with or without saccharated pepsin, or morphine (gr. $\frac{1}{40}$), are frequently resorted to. The alkali is not incompatible with pepsin in this case, because it is not given in sufficient quantity to overcome the acid reaction of the stomach contents, but merely to reduce it so that they shall be less irritating. Where there is much irritability of the stomach, Ringer advises the use of the alcoholic extract of belladonna (gr. $\frac{1}{4}$) once or twice daily.

In accordance with the theory that secreting follicles are stimulated to action by having their mouths moistened with a solution of opposite chemical reaction to their own, it is recommended in cases of acid stomach due to hyper-secretion, that some acid should be administered before eating, when the stomach is empty. Hydrochloric acid (dilute) is usually given, which is also antiseptic, and possibly some of its good effects may be due to its power of checking fermentation.

Where there is defective secretion of gastric juice, an alkali given some time before eating is often efficient, especially when combined with a bitter, such as gentian, as already indicated.

If the muscular movements of the stomach are insufficient, tonics are useful, and when given in the intervals of digestion, they have a local as well as general effect.

When the movements of the stomach are painful, the condition may be due to neuralgia (often malarial), but is most frequently associated with some lesion of the stomach or neighboring organs. The treatment of gastric catarrh, ulcer, or cancer does not enter into the limits of the present discussion. For simple gastralgia, nothing can be compared with some preparations of opium, such as morphine, chlorodyne, or the deodorized tincture, and yet it will often be injudicious to give it on account of the tendency to this form of indulgence; the moral and physical wreck which opium-eating produces is familiar to every one Sometimes malt liquors, Vichy or champagne, on account of their carbonic acid, are able to relieve the pain; at other times remedies given in hot water (*i. e.* Sprudel salt, sodium or potassium bromide, or bicarbonate, etc.,) are more acceptable. The alkaline chloroform mixture is worth trying; but hydrocyanic acid for this purpose has usually proved disappointing. In some cases the pain is so severe as to require the administration of an anæsthetic. Counter-irritation by a blister, dressed with morphine (gr. $\frac{1}{2}$) sometimes gives great comfort. Of course, if any general cause such as gout, lithæmia, uræmia, rheumatism, malaria, or neuralgia is found to co-exist, proper treatment would

not be neglected. In cases of painful hyperæsthesia of the stomach, it is sometimes useful to keep the patient upon an absolute milk diet for several months, or to resort to rectal alimentation and prohibit food for weeks or even months at a time.

So-called carminatives are useful in relieving the pain and promoting the expulsion of flatus; and also in stimulating the secretion of gastric juice and the movements of the stomach. If long-continued, they may excite gastric catarrh.

One of the most common conditions of the stomach calling for correction is microbic infection, producing what is called sour stomach, foul stomach, etc., accompanied by malaise, heart-burn, and water-brash. As Leared has shown,* heart-burn is due to a peculiar butyric acid fermentation of starchy food, or to its liberation in the stomach from food in which it previously existed. It is relieved by the administration of an alkali, and sometimes by cod-liver oil. Where there is much flatulence, the same writer advises fresh charcoal, on account of its absorbent powers. Fresh toasted bread, eaten dry, is also useful for this reason.

Where the stomach is constantly the site of acetous, lactic, or butyric fermentation, it is advisable to give antiseptic agents, such as iodine and carbolic acid.

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* The *Causes and Treatment of Imperfect Digestion*, London, 1866, p. 216.

℞ Tr. iodi, ʒ j.
Acidi carbolici., ♏xx.
M. Sig.—Take 3 to 5 drops before or after meals well diluted.

Salicylic acid may be used, or thymol, or resorcin, with good effect, in doses of twenty to thirty grains daily. Salol has been also used for this purpose, but is better adapted to intestinal antisepsis. Beta-naphthol, in doses of one or two grains, is also serviceable, and exerts a laxative effect upon the bowels. Naphthaline may be used in larger doses for its antiseptic action. Possibly part of the good results from small doses of arsenic, and from quinine, in stomach disorders, is due to the antiseptic action they possess. When the tongue bears a creamy-white or yellowish coating, associated with foul stomach, alkalies, mild mercurials, and purgatives do good.

When the microbic infection resists the above remedies, we can resort to irrigation, or washing out the stomach.

Irrigation of the Stomach.—This procedure is often of great benefit in inveterate dyspepsia. It may be resorted to for diagnostic purposes, or as a preliminary to feeding by the tube, but it is only to be considered here as a remedial measure. Soft rubber tubes are to be used, having a funnel-shaped enlargement at their open extremity, into which, after their introduction, the detergent fluid can be poured. After about a pint or more, according to circumstances, has

been infused, then the free end can be turned downwards so as to constitute a syphon, which accordingly empties the stomach. The fluid used may be pure warm water, or it may be improved for this purpose by adding an alkali (sodium or potassium carbonate, gr. xxx to the pint); or an antiseptic may be used, like borax, sodium chloride, sodium salicylate (1 per cent. solution), resorcin (2 per cent. solution); thymol, and the sodium silico-fluoride (.1 per cent. solution), could also be used with advantage. Vichy or Carlsbad water is also recommended for washing out the stomach; though some prefer plain water. The tube should be from 3 to 5 feet in length, and be introduced to the extent of 20 to 25 inches; a moderately small diameter is preferable (10 mm.), and the tube should have such thickness as not easily to permit the obliteration of its lumen by lateral pressure. It should be oiled with cacao butter or sweet almond oil when introduced, and the patient instructed to make efforts at swallowing at the same time that it is being gently pushed down into the stomach. The temperature of the fluid should be governed by the sensations of the patient. As to the time, it should not be done more frequently than once a day, and some cases do not require it oftener than twice a week. Küssmaul, who in 1867 introduced this valuable method of treating stomach-disorders, selects the morning, before breakfast, as the proper time, and many follow this advice; but there is some advantage in postponing it until about

half an hour before the principal meal of the day. Great relief is usually felt by the patient after the washing of the stomach, but this should not lead to its too frequent repetition. Occasionally, hæmorrhage occurs, and a fatal result even has followed.*

Artificial Digestants.—The use of pepsin since its introduction into medical practice, about 1854 by Corvisart, has increased to an enormous extent until it has become a standard article of commerce. In combination with sugar of milk as recommended by Scheffer, of Louisville, in order to bring it into the powdered form, it was admitted into the Pharmacopœia of the United States in 1880.

Within a few years, however, improvements have been made in the preparation, so that its digestive power has been greatly improved. In fact, the pepsinum purum in lamellis (P., D. & Co.) has a digestive power forty times as great as the officinal form. The solution in glycerin is the most eligible for administration while the various wines and elixirs purporting to contain pepsin, have very little digestive power, and

* A curious case was lately reported by Dr. Martin, of Addenbrooke's Hospital, Cambridge. Two hours after washing out the stomach, the patient complained of stiffness of the jaws and rigidity of the arms; consciousness was retained. The temperature rose to 107½° before death, which occurred 6½ hours after the operation. The symptoms resembled tetanus. There was no ulceration or abrasion, and no brain lesion. *Practice*, vol. xxxviii, p. 139.

are chiefly useful for the alcohol they contain. Pepsin, that is to say an active pepsin (because some pepsins are nearly inert*), has its special place in cases of

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* In confirmation of this statement the reader is referred to a report by Prof. R. H. Chittenden, of Yale University, on some commercial digestive ferments, read before the New York Academy of Medicine (Jan. 23, 1889) which concludes as follows:

"After these methods I have tested the following brands of pepsin, obtaining as a preliminary result the following figures expressive of their relative proteolytic action.

"The "Pepsinum Purum in Lamellis" having the highest digestive power is taken as the standard (100):

	Preliminary test of Relative Proteolytic action.
1. Parke, Davis & Co 's Pepsinum Purum in Lamellis	100
2. Fairchilds' Pepsin in Scale	73
3. Scheffers' dry Pepsin concentrated	70
4. Jensen's Crystal Pepsin	56
5. Ford's Pepsin in Scales	54
6. North's Pure Pepsin	36
7. Boudault's Pepsin	35
8. Royal Chem. Co.'s Pure Pepsin	27
9. Scheffer's Saccharated Pepsin	16
10. E. Merck's Pepsin Germ. Pur. Pulv	11
11. Lehn & Fink's Powdered Pure Pepsin	0

"From these data, which are the average of many results, we might infer that Fairchild's pepsin, for example, contains three-fourths as much active ferment as the Pepsinum Purum of Parke, Davis & Co. and that Ford's and Jensen's pepsin contain approximately half as much true ferment as the Pepsinum Purum. Such a conclusion, however, would be fallacious and to obtain the true measure of proteolytic action we must proceed further and determine next the relative amounts of the

slow, laborous and difficult digestion, and is suited to the class of sedentary dyspeptics who would without it, be compelled to resort to alcohol. In irritability

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different preparations needed to produce a like result in each case. After this method we find, for example, that it requires about twice as much of Fairchild's and Scheffer's Pepsin to form a given percentage of peptone as of the Pepsinum Purum, and that of Ford's and Jensen's preparations about three times as much, thus showing that the true difference in proteolytic power is considerably greater than the preliminary results alone indicate. As a final result then we may consider the true proteolytic power of the above ferments compared with the one of highest digestive power to be as follows:

	Relative Proteolytic Action.
1. Parke, Davis & Co.'s Pepsinum Purum in Lamellis	100
2. Fairchild's Pepsin in Scale	52
3. Scheffer's dry Pepsin, concentrated	48
4. Jensen's Crystal Pepsin	35
5. Ford's Pepsin in Scales	32
6. North's Pure Pepsin	16
7. Boudault's Pepsin	14
8. Royal Chem. Co.'s Pure Pepsin	9

"In considering these results it is to be borne in mind that the same brand of pepsin is liable to slight variations in digestive power, doubtless dependent in part upon the condition of the membranes from which it is prepared. Thus in many instances I have found one or two of nearly the same digestive strength changing their relative positions, notably, Nos. 2 and 3 and Nos. 4 and 5.

"As to the actual strength of these preparations 1 milligram of the strongest pepsin converted into soluble products 198 milligramms of the pure dry albumen, which would be practically equal to 2000 parts of fluid egg-albumen."

of the stomach pepsin acts as a sedative to the peptic glands, and vomiting may often be checked by it, either alone, or in combination with bismuth. A useful combination would be:

℞ Glyceriti pepsini (P., D. & Co.),
Acid. hydrochloric dilut., ää f ʒ ss.
Aquæ destillatœ, f ʒ j.
M.

Dose, a teaspoonful after each meal, for weak digestion.

In dyspepsia, pepsin is particularly required when the appetite has overcome the judgment, and the patient finds that he has over-loaded his stomach.

In the dyspepsia of weakly infants that are brought up on cow's milk, more or less diluted, pepsin is a veritable boon. In this case, a glycerite of calf-pepsin is probably more suitable than the ordinary form.* Pancreatin, or trypsin, is only active in an alkaline medium, and, therefore, is not suited to stomach disorders. The vegetable digestive agents, papoid, papayotin, etc., have not as yet won a place for themselves in competition with pepsin. An artificial gastric juice is officinal under the name of liquor pepsini,

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* See article appearing in the *Dietetic Gazette*, July, 1889, entitled "Glyceritum Pepsini Vitulini (Glycerite of Calf-Pepsin), a Form of Digestive Ferment especially adapted to the Treatment of Apepsia in Young Infants," read by the writer before the Dietetic Committee of the American Medical Association, Newport, June 25, 1889.

U. S. P. (containing saccharated pepsin 40, hydrochloric acid 12, glycerin 400, and water sufficient to make 1000 parts), of which the usual dose is a tablespoonful; but this is far less efficient than the formula already given. As pepsin is only active in the presence of free acid, we may regard the acid as an essential part of the gastric juice. In cases, therefore, of weak digestion, there may not be so much a deficiency of pepsin as of acid; hence the utility of weak mineral acids, phosphoric, citric (lemon juice), or hydrochloric, in some cases of *embarras gastrique*, which, as Peter insists, should not be confounded with gastritis, as it is very apt to be.

Eccritics.—The employment of emetics has almost become obsolete, and yet they are often of very great service, and occasionally take the place of washing out the stomach with the tube. The administration of ipecacuanha in ten or twenty grain doses not only empties the stomach completely, but also unloads the portal circle, forces the bile from the gall-bladder, stimulates the liver and pancreas, and starts the secretions all over the body. Where a dyspeptic has overloaded his stomach, it is good treatment to evacuate the viscus, and put the patient upon rather spare diet for a few meals until his stomach somewhat recovers its tone, in which it will obtain much assistance from strychnine or tincture of nux vomica. When there is much fermentation going on in the stomach, producing dilatation, prompt relief can be afforded by

an emetic, simply of chloride of sodium and warm water, used freely.

Purgatives have been used in dyspepsia from time immemorial, on account of the constipation which results from deficient secretion by the intestinal follicles. Various forms of cathartics are in use for this purpose. The salines simply act for the time in emptying the intestine; the resin-bearing cathartics generally cause pain, and when long continued gradually lose their effect from torpor of the intestines.

A chapter might be written on the abuse of purgatives in these cases. The mercurials cannot be long continued, or given frequently, on account of the danger of ptyalism. Without reviewing the long list of purgatives, one or two of especial value may be mentioned. Rhubarb, when of good quality, is a gastro-hepatic stimulant as well as a laxative; it can be taken for a long time without injury or without losing its effects. Where the constipation is obstinate, cascara sagrada, which resembles rhubarb in its action, is admirably adapted to suit the condition. The fluid extract may be given in twenty-drop doses three times a day, or it may be given in the form of cascara cordial, which is pleasant to the taste and is carminative from the spices which it contains. Under the use of cascara, the constipation disappears, the secretions increase, the digestion and appetite increase, and the general health is greatly improved. Podophyllin is a common ingredient in dinner pills. It may be given

in the form of resin, either alone, or as recommended by Ringer.

℞ **Res. podophylli, gr. ⅛.**
Tr. zingiberis, ♏ vii.
Alcoholis, q. s. ad f. ʒ j.
M.
At the bed hour.

Germain Sée, who agrees with Peter as to the importance of dyspepsia as a fore-runner of consumption, advises the taking of Vichy water, half an hour before each meal, in order to increase the secretion of the gastric juice.

Carlsbad Sprüdel Salt, given in hot water before meals, stimulates secretion and removes mucus from the stomach.

The secretions are also increased by the means next to be considered, which deserve separate consideration.

Electricity and Massage.—The application of electricity is yet in its infancy in the treatment of dyspepsia, but those who have used it are almost without exception in favor of it. No matter what form is used, galvanic, faradic, or static, whether general or local, in every direction in which the inquiry is pushed favorable answers are obtained. Referring the reader to the works on clinical electro-therapeutics for details, we merely express a belief that in true dyspepsia more permanent good can be obtained from this agent than from any combination of drugs that has

yet been formulated. Faradization of the stomach and abdominal viscera, with general galvanization, once a day, will relieve the constipation, stimulate peristalsis and the secretions, give tone to the stomach increase the appetite, and improve the digestion. Possibly, expectant attention and the fact that a somewhat mysterious agent is used, have great influence in bringing about these results. This will be fully appreciated by the readers of Tuke's suggestive work.*

Massage is also of great value. We need only quote the words of Playfair to give an idea of what it is capable of accomplishing ; he claims that if he is "given a girl who has wasted to a mere shadow, he would in a fortnight put her into a condition to eat with pleasure more than a Life-Guardsman could manage."†

Massage and electricity are the essential points in the rest-cure of S. Weir Mitchell, which is well adapted to overcome persistent ill health associated with poor digestion.

Within limits, both electricity and massage can be applied by the patient himself under the instruction of a physician, although with less advantage than under skilled hands. Kneading and rubbing the limbs, before rising in the morning, is a good preparation for

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* Illustrations of the Influence of the Mind on the Body in Health and Disease; Designed to Elucidate the Action of the Imagination. London, 1884, 2d ed.

† *British Medical Journal*, 1887, Jan. 15.

the sponge-bath and flesh-brush, which leave the skin in a glow and give the individual a good start for the day. The rubbing stimulates the skin like electricity and probably is accompanied by some alteration in the distribution of the normal currents of electricity developed in the body by chemical changes and tissue-metamorphosis.

DIETETIC HINTS FOR DYSPEPTICS.

The views already expressed regarding the nature of dyspepsia, afford a hint as to the course of diet to be followed. The conditions are well stated by Thomas King Chambers in his work on "Digestion and Its Derangements,"* and as the rule is *obsta principiis* in rational therapeutics, his principles of treatment may be introduced by his views on the etiology of the disease. Referring to inefficiency produced by gastric debility he writes: "It is this latter sort of deficiency which is congenital in some individuals, who constitute one class of what is familiarly known as as 'poor creatures'—persons who, without any classifiable disease, are always over-exerting themselves and yet are unable to live like their neighbors without failure. From deficient powers they are unable to digest at each meal enough to take the place of the usual interstitial destruction, and, therefore, if the outgoings are not limited, or the incomings increased, by special management, their tissues must suffer, and innumerable ailments arise as consequences of over-destruction.

"They cannot form enough gastric ferment to dissolve the usual quantity of food taken at a meal, therefore, unless its place is partially supplied by excess of water, the mass will not obey the peristaltic wave,

* London, 1856; pp. 369-373.

but remains in the stomach, decays, excites congestion and mucous secretion, perhaps establishes a chronic mucous flux, feels like a weight to the nerves, and is passed on covered with mucus and so prevented from being digested in the intestines." The remedy advised is:

"1. To let the albuminoid food be as liquid as possible.

"2. To let the quantity requisite for the day's consumption be taken at frequent short intervals, and, if it is likely to turn sour:

"3. To guard against it with alkalies. Thus we may get it to pass unaltered into the intestines, and by trusting to their digestion, spare the stomach without starving the patient."

This is good advice for an emergency, but it would not be advisable to permanently place the stomach to one side, or it might lose its pepsin-forming action altogether. The recommendations of Dr. Chambers in general are very good. He advised his patients to take cold water in place of tea or coffee, and even suggests a lemon water-ice as a substitute for tea. Eat in company, rest after a meal, eat at short intervals, avoid eating very much at one time, a light repast of biscuit and beef-tea or a cup of gruel at bed-time—these are his principal points of treatment. Accessory food (tobacco and alcohol, tea and coffee) are useful to diminish waste, although they also retard digestion.

With regard to tea-drinking and its influence upon digestion, it is very highly praised by Germain Sée, and yet we constantly meet cases of so-called dyspepsia in women that are attributed to the cup that "cheers but does not inebriate." It is probably true that it is not the fault of the habit of tea-drinking so much, as it is the deprivation of other food—where tea is allowed to take the place of food,—that causes the debility and the dyspeptic symptoms. At the same time the tannin in the tea retards the action of the gastric juice, and it is, therefore, injurious in cases of weak and slow digestion, though useful where digestion is too rapid. In any individual case, the effects of tea and coffee are easily determined by experiment, and their use governed accordingly.

Dr. James W. Fraser* has experimentally examined this question, and concludes that it is better not to eat most forms of albuminous foods at the same time that infused beverages are taken, as the latter will generally retard digestion. Absorption may be more rapid, but there is loss of nutritious substance. On the other hand, the digestion of starchy food appears to be assisted by tea and coffee; and gluten (the albuminoid of flour) is the principle least retarded in digestion by tea, and it only comes third with cacao, while coffee has a much more retarding action on it. From this it appears that bread is the natural

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* *Journal of Anatomy and Physiology*, April, 1887.

accompaniment of tea and cacao when used as the beverages at a meal. Perhaps this action of coffee explains why it is usually drank alone or at breakfast, a meal which consists, in this country, of meats (eggs and salt pork) which are not much retarded in their digestion by coffee. He considers eggs the best form of animal food to be eaten with infused beverages. Apparently they are best when lightly boiled when tea is used, or hard-boiled if coffee or cacao is the beverage. Some dyspeptics are unable to take eggs in any form except when they are poached. "The casein of milk and cream taken with these beverages, is probably absorbed, in a large degree, from the stomach. The butter used with toast or bread, undergoes digestion more slowly in the presence of tea, but more quickly with cacao or coffee. The use of the latter as excipients for cod liver oil, therefore, not only depends upon their ability to cover the taste, but also upon their power of assisting the digestion of fats." *

In the same manner the effects of alcohol have been investigated by many able physiological chemists. The experiments of Scheffer upon the action of alcohol upon pepsin, were at first so decided, that he announced that even small quantities of spirits not only checked digestion, but precipitated the pepsin and rendered it inert. Subsequently he modified this

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* *Practitioner*, London, 1887, p. 461.

statement, but still claims that it very decidedly interferes with the action of pepsin.* In opposition to this, is the almost universal habit of taking wine, or alcohol in other form, with the food. Gluzinski has demonstrated that even small quantities retard the digestion of albuminoids; but they rapidly disappear from the stomach, and after absorption they increase the secretion of the gastric juice, and accelerate and increase the power of digestion. Large doses retard digestion and cause hyper-acidity. It follows, therefore, that if alcohol is to be given at all to assist in digestion, it should be administered preferably in small quantities, and best of all, a short time before meals; any momentary delay which occurs before its absorption being then of no account, while the increased secretion, as already said, of gastric juice, will be available when the food is taken into the stomach. The constant use of alcohol in this way, however, is apt to induce catarrh of the stomach and disease of the liver. This question, however, has already been sufficiently discussed when on the subject of treatment.

With regard to individual articles of food, it is not within our province to explain why "one man's meat is another's poison;" but if any individual discovers that veal gives him cholera morbus, or lob-

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* *American Journal of Pharmacy*, 1870, p. 98; 1871, p. 6; 1872, p. 784.

ster produces urticaria, or strawberries or alcohol bring on gout, or apple gives him flatulent colic, let him accept it as a fact worth knowing, and regulate his diet accordingly. At the same time, admitting that stomachs vary in digestive capacity, we may in a manner classify food, from the dyspeptic's standpoint, into good, bad, and indifferent, or easily digestible, moderately digestible, and indigestible.*

Easily Digestible Food.—Roast or boiled mutton, sweet bread (thymus of calf), chicken and game fowl. Animal broths can be made more nourishing by the addition of barley or rice. Beef tea or beef essence is almost valueless as a nourishment by itself, but is rendered nutritious by the yelk of an egg or some farinaceous substance. Mutton or chicken broth, with barley or rice, is also very acceptable to a delicate stomach. Milk often disagrees with the adult stomach, partly on account of its readiness to sour, and partly because it is a concentrated form of food. It can be made more acceptable by the addition of lime water, a tablespoonful to a gobletful of milk. Some prefer the milk to be made hot, and this is an advantage, as it is then drank more slowly; milk should be sipped as a food, and not swallowed in large quantity to relieve thirst. Hot water, which may be flavored with a little peppermint, lemon, or

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* These remarks on food are principally taken from Leared's work, already quoted.

ginger, is useful to dyspeptics, and may be taken, half a pint at a time, fifteen minutes before a meal. This removes the mucus from the stomach, as well as any detritus from the preceding meal, and prepares the stomach for digestion. The philosophy of taking thin soup as the first course of dinner is evident.

Fresh fish are more easily disgested than salt, the best way being baked or boiled; boiled fish are less digestible, fried the least.

Dry toast, dip-toast, stale wheaten bread or biscuit, rice, tapioca, sago, arrow-root, corn starch, gelatine, calves-foot jelly, are usually acceptable to weak stomachs.

Of vegetables, baked white potatoes, asparagus, green peas, cauliflower, rice, mashed potatoes, string beans, lima beans, sugar corn, when taken in moderate quantities.

For dessert, baked apple, stewed fruit, oranges, grapes, blackberries, whortleberries, or strawberries.

As a beverage, small quantities of ice water, cold tea, sometimes a light malt liquor, or a glass of sherry, or a good sound claret. A small cup of black coffee after dinner; tea or cacao for breakfast and supper; although some find that they can digest their food better when they refuse all infused beverages, and drink only water with their food.

Moderately Digestible Foods.—Beef, lamb, rabbit, pigeon, turkey, duck, woodcock, snipe; soups in general; eggs not hard-boiled; cod, haddock, pike, trout,

raw oysters; potatoes, turnips, cabbage, spinach, lettuce, apricots; peaches, apples, gooseberries, pineapple, currants, raspberries; bread and other farinaceous puddings; butter; fruit jelly, marmalade, cooked fruit.

Tea, coffee, malt liquors and wines,—Madeira, Burgundy and Port.

Comparatively Indigestible Foods. — Pork, veal, goose; the heart, kidney and brain of animals; salt meats, sausage, hashed or stewed meats (*i. e.*, cooked over again; when made of fresh meat they are often very acceptable to the stomach, and comparatively easily digested); mackerel, eels, salmon, herring, sprats, sturgeon, lobster and other shell fish, cooked oysters; salad oil, melted butter, buttered toast, muffins, new bread, pastry in general, suet puddings, pancakes, custards, articles made with maize or Indian meal; nuts of all kinds, pears, plums, cherries, dried fruits, raw cucumber, beets, onions, carrots, parsnips, peas, beans, mushrooms, pickles; chocolate, champagne, liquors.

A few aphorisms may be introduced here:

Hot water is more digestible than cold.

The flesh of young animals is less easily digested than that of full-grown animals.

The flesh of wild animals is more digestible than that of domestic animals.

Land birds are more digestible than water fowl.

The white parts of the flesh of certain birds is more digestible than the dark.

Heart, liver, kidneys and brains of animals are indigestible, but sweet-bread is not.

White-fleshed fish are more digestible than the red-fleshed varieties.

Oily fish, and shell-fish, are generally indigestible; the fleshy part of the raw oyster, however, is sometimes very well borne. As suggested by Randolph, oysters and other meats may be partially peptonized before administration, and thus made highly nourishing without taxing the digestive organs.*

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*Inasmuch as impaired nutrition is one of the attendants upon confirmed dyspepsia the following formulæ and directions for preparing pancreatic emulsions, peptonized foods, etc., will be found useful in some cases, and may be introduced here.

Pancreatic Emulsions, or pancreatized oils, are prepared by combining some easily emulsified fat with pancreatin into a permanent emulsion. It is found that in wasting diseases, particularly of children, such a combination is often assimilated where no other food is tolerated, and many patients who cannot take cod-liver oil in any other form, even when perfectly emulsified, find no difficulty in retaining and digesting a pancreatic emulsion, which, moreover, if made from a tasteless fat, is not at all unpleasant to take.

Peptonized Milk.—An ideal food for a delicate stomach is produced by subjecting pure milk to the action of pancreatin. It is most readily prepared by adding to a pint of milk, warmed to about 110° F., a tablespoonful of liquid pancreatin (P., D. & Co.'s) with twenty grains of sodium bicarbonate previously dissolved in a gill (four ounces) of water. The mixture

The fat of broiled bacon is easy of digestion, so is cod-liver oil; but these are exceptions to the general rule that greasy or oily food should be avoided.

Vegetable food is generally less easy of digestion

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is kept in a warm place until the opaque whiteness of the milk gives place to a grayish color, and a distinct, but not too pronounced, bitterness is developed in it. As soon as this stage of change is reached, the milk should be removed to a refrigerator, or cooled rapidly by other means, to prevent further action of the pancreatin. It should not be kept more than a few hours after it is prepared; the best way is to make it fresh as often as it is wanted, and this involves no more trouble than would be required for preparing the simplest article of food. The milk, if completely peptonized, is already practically digested and ready for immediate absorption. It is no longer susceptible of coagulation by rennet or by the action of acids.

In place of the liquid pancreatin, the pure pancreatin may be used. Five grains of this preparation together with twenty grains of sodium bicarbonate should be put into about a gill of tepid water and allowed to macerate 15 minutes, and a pint of warm milk should then be added, and the mixture allowed to stand in a warm place until a scarcely perceptible bitter taste is developed. If the pancreatin fails to peptonize the milk it must be condemned as a worthless article. An active pancreatin may become so deteriorated, however, by age that an increased quantity may be necessary to produce the required effect.

Heat is not absolutely necessary for the peptonizing process. The milk may be diluted with half its volume of lime water, pancreatin added in the proportion of five grains to the pint of milk, and the mixture allowed to stand three or four

than animal, and dyspepsia may be aggravated by eating the core, skin, or kernels of fruit. Pears, on account of the gritty material they contain, and some small seeded fruits, are very obnoxious.

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hours, with occasional stirring at ordinary temperature. If the flavor of the peptonized milk is objected to by the patient, the pancreatin may be swallowed in a capsule, and the milk, mixed with lime water, or sodium bicarbonate, taken immediately afterwards.

Peptonized milk is food, not medicine, and must of course be administered in such quantity and frequency of dose as the patient's condition may require. It is an easily assimilated and highly nutritious article of diet, which generally proves acceptable even to an irritable stomach, and is eminently useful in the convalescence from acute diseases—in organic gastric affections, and in all wasting diseases, chronic or acute, in children or in adults.

Peptonized Gruel.—Gruel may be prepared from wheat-flour, oat-meal, arrow-root, or any other farinaceous material. It should be well boiled, and made quite thick and strong. Pour into a pitcher and add an equal quantity of cold milk, and pancreatin in the same proportion as for peptonizing milk. As soon as the characteristic bitterness becomes slightly developed, raise the temperature of the mixture to the boiling point to put a stop to the action.

The preparation is rendered more palatable to many persons by adding a little pure gelatin or isinglass, after the final boiling, and allowing to cool in molds to be served cold with sugar and cream.

*Peptonized Beef-Tea.**— Half a pound of finely minced lean beef is mixed with a pint of water and 20 grains of bicar-

* Formula of Dr. Wm. Roberts.

In bad cases of acidity, great advantage will be gained by substituting simple flour-biscuit for bread. Graham bread, or bread containing a small proportion of bran is both sweet and wholesome.

---

bonate of sodium. Simmer two hours. When cooled to about 115° F. add 5 grains of pure pancreatin, or a tablespoonful of the liquid pancreatin, and set in a warm place two hours. Raise then to the boiling point, decant the liquid portion, add salt to taste. The beef-tea thus prepared is rich in peptone, and of much higher nutritive value than ordinary beef-tea.

*Peptonized Oysters.**—The oysters of an ordinary stew, containing milk, are removed and finely minced, then returned to the liquid portion of the stew. The whole is brought to a temperature of 100° F. and peptonized in precisely the same way as pure milk. When peptonization is sufficiently advanced (*i. e.*, at the end of half an hour) the mixture is strained, and may then be served at once hot, or else raised to the boiling point, and enough gelatin added to cause the preparation to set when cold; pour into suitable moulds, and serve cold as a jelly.

*Peptonized Milk Toast.**—Ordinary milk toast, in which there is an abundance of milk, treated in the manner just described, becomes an almost homogeneous pulpy mass, which, when the crusts have been removed, is usually acceptable to the irritated stomach. These preparations have the advantage over the simple peptonized milk or gruel, that they have a more appetizing flavor, and, following the foregoing hints, by the exercise of a little ingenuity, considerable variety can be introduced into a diet of pre-digested food.

Peptonizing Tablets.—To facilitate the preparation of peptonized milk, Messrs. Parke, Davis & Co. have recently

* Formula of Dr. N. A. Randolph.

In great hyperæsthesia of the stomach spices do harm, but in tardy digestion they often are useful. Cayenne pepper is a common ingredient in dinner pills, and slow digestion is sometimes greatly benefited by a teaspoonful of whole mustard seed after dinner.

Koumys is a grateful addition to the dyspeptic dietary, and can sometimes be taken when ordinary milk is unsuited. It is made as follows:

Put one quart of sweet milk into a farina-boiler, and stir constantly until it has reached blood-heat. Dissolve one-quarter of a cake of compressed yeast in two tablespoonfuls of lukewarm water; stir the yeast until it is thoroughly dissolved. If you are unable to procure compressed yeast, two tablespoonfuls of liquid yeast may be used. Take one ounce of sugar (which is equal to two tablespoonfuls of sugar level to the brim) and dissolve it in two tablespoonfuls of water;

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added to their list, tablets or compressed pills of pancreatin, 2½ grains, put up together with separate tablets containing each ten grains of sodium bicarbonate. Put a pair of the tablets which contain just sufficient material to peptonize one-half pint of milk, in half a gill of tepid water and stir at intervals until they are completely disintegrated. Add then half a pint of milk previously warmed to blood heat, and allow the mixture to stand in a warm place until peptonization has proceeded to the desired extent.

Milk containing a large proportion of casein will sometimes curdle under the influence of the pancreatin. This difficulty may be obviated by increasing somewhat the proportion of water and of pancreatin, or reducing that of the milk.

stir over the fire until it boils, and then allow it to boil ten seconds; when you should have a perfectly clear syrup. Put the yeast into the milk and then add the syrup, stirring backward and forward, until they are thoroughly mixed.

Fill a quart bottle up to the neck with the mixture, and put in a tight fitting cork, which must be fastened down by means of a string; and keep the bottle in an upright position at a temperature of 70° F. for twelve hours; then in a temperature of 55° F., the bottle being placed on its side. The koumys is ready for use in twenty-four hours; but patients often prefer it after standing forty-eight hours, as the taste is then slightly more acid.*

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* *Medical and Surgical Reporter*, Jan. 21, 1889, p. 34.

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COMPARATIVE

DIGESTIVE POWER OF PEPSINS.

R. H. Chittenden, Ph. D., Professor of Physiological Chemistry at Yale University, in a paper on Digestive Ferments, read before the New York Academy of Medicine, January 23, 1889, and published in the *Philadelphia Medical News*, February 16, 1889, says:

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5	Ford's Pepsin in Scales	32
6	North's Pure Pepsin	16
7	Boudault's Pepsin	14
8	Royal Chemical Co.'s Pure Pepsin	9

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